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We Need a Cost-Effective Vaccine

Economists can destroy "the vibe" at parties (remember parties?) by asking participants to "define their terms". Very few terms are misused more than "cost effectiveness". Austin Frakt did so in the May 11 *New York Times*, where he conjoined valuation of life with cost-effectiveness analysis (https://www.nytimes.com/2020/05/11/upshot/virus-price-human-life.html). Valuation of life refers to the benefits of saving a life – cost-effectiveness refers to the costs. In particular, he was looking at the cost of an additional year of good health.

In evaluation research, economists seek a resource allocation that gives the biggest bang for whatever batch of bucks we are spending. The "bang" refers to "well-being" in terms of additional years of life years, for example, less the cost of prolonging that life or the "buck". An intervention is termed *economically efficient* if it maximizes the difference between the bang and the buck. In contrast a benefit-cost analysis simply compares the bang and the buck. If the bang exceeds the buck then there is a Benefit-Cost ratio that exceeds 1. This is a much lower bar than economic efficiency, because there are conceivably lots of allocations that may have a B-C ratio greater than 1, but are not "efficient."

Cost-effectiveness analysis is neither. Early uses of cost-effectiveness analysis were in the purchase of armaments after World War II. The "Iron Curtain" had come down and we wanted to prevent a war with the Soviet Union. Our opponents had fighter planes and we needed fighter planes. Our opponents had missiles and we needed missiles. Our opponents had submarines, and we needed submarines. A decision might be made to procure 200 fighter planes, 100 missiles, or 10 submarines. Cost-effectiveness analysis was to guide us to the <u>least expensive</u> way to make each of those purchases. Lurking in the background were the benefits of avoiding another war, but no one seriously sought to put a valuation on them – how, exactly does one value "freedom". The decision had been made, and the procurement was performed (sometimes more effectively than others) to get the fighters, missiles, or submarines.

In the health sector cost-effectiveness has referred to cost per incremental improvement, where the cost is in the numerator and the effectiveness is in the denominator. Frakt provides a good discussion in his article by referring to the cost of a "Quality Adjusted Life Year" or QALY. Your blogger notes that if a health care recipient receives a treatment costing $50,000 and it gives her one-quarter of an additional QALY, the cost per additional QALY is $200,000, that is $50,000 divided by one-quarter year. Is that a little or lot? Since no valuation is given, we cannot tell whether this is efficient.

In health policy analysis, evaluators have often used a "cut-off" point of $50,000 per QALY. That means that one should adopt an innovation if it costs $50,000 or less per QALY; if more, it should not be adopted. This is totally

arbitrary and has no relation to any sorts of benefits. Dozens of economic analyses (some by CDC staff economists) have shown why this is so. Frakt notes that more recently many health economists have adopted $100,000 to $200,000 for the cut-off point. This is no less arbitrary and no more right.

All that said, in May 2020, we must seek one or more COVID-19 vaccines … and quickly … and probably expensively, and we must use cost-effectiveness analysis to guide us. Vaccines will undoubtedly bring great benefits, just like we felt in the 1950s in terms of avoiding an unthinkable nuclear war, but no one is measuring benefits now. The term "Manhattan Project" is used as a comparison, and while hackneyed, it is apt. The apocryphal story about the July 16, 1945 explosion of the first nuclear device in New Mexico is that Project Leader J. Robert Oppenheimer didn't know if it would work. Within 4 weeks, World War II was over.

A quick search for the Manhattan Project (https://www.ctbto.org/nuclear-testing/history-of-nuclear-testing/manhattan-project/) notes that it employed more than 130,000 people and cost nearly US$ 2 billion at the time, roughly equivalent to $28 billion in 2019 dollars. A (set of) vaccine(s), developed for $28 billion now would, without question, be cost-effective. We would be happy with twice that cost.

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